

THE ¹/₂
USE
Of the
Nocturnal.

Written by *W. P.*

The Nocturnals and these Books, are to
be sold by *Joseph Moxon*, at his
shop in *Corn-hill*, at the sign of
Atlas, in *London*. 1655.

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THE USE Of the Nocturnal.

1. *What the Nocturnal is.*

IT is an Instrument consisting of two parts :

1. A *Circle*, which is divided into 24 hours; and each hour into so many parts as the space between each hour will admit of. The common Nocturnals are divided into four quarters, and each quarter into three parts; so as the whole hour is divided in 12 equal parts; each equal part containing five Minutes, as you may see in the Nocturnal it self; upon the hour of 12 there is placed a *Flower de Luce*.

The second part of it is a *moveable Ryndle*, the Circle whereof is fixed to the Center of

the Circle of hours, that so you may turn it round, as occasion requires. The outmost edge of this Rundle is divided into 365 parts, shewing the days of the year; and the next within this, is the Months of the year, marked with the first letter of each Month, as I. for *January*, F. for *February*, and so of the rest.

And also in the Circle are divisions, numbered with 10, 20, 30, shewing the number of days comprehended between the beginning of the Months, and the division to which these Figures are annexed.

Within this Circle is described those fixed stars that are near the North-Pole, and belonging to five Constellations; whereof that which is in the middle, is called *URSA MINOR*, (of some *HELICE MINOR*) which in English is the *little Bear*, it being in the form of a Bear.

This Constellation consists of seven stars, whereof three onely are splendent; that is the *Pole star* in the end of the *Tayl*, and those two that are in the foreparts of the *Bear*, one of them upon his Back neer the Neck, and the other upon his side; and these two are called of our Mariners *the Guards*, These three stars are of excellent use in Navigation, and well known by Seamen.

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The next Constellation is DRACO, or the Dragon, and hath sundry stars which you may learn to know by the Rules following. The third is BOOTES. The fourth is CASSIOPEIA. The fifth is URSA MAJOR, or the great Bear.

And lastly, there is six Lines drawn through the Pole, which are Meridians, and are of great use, as you shall learn hereafter.

Here followeth several Uses of the Circles of the Nocturnal.

1. The round Circle whereon the Rundle is fixed, which is divided into 24 hours, notes the 24 hours of the Night and Day, and also the quarters of every hour, and the third part of each quarter, which is but five Minutes; so that you may work to five Minutes of time by this Instrument, be it either time given, or time sought for, as the question importeth.

2. The use of the Months, and their divisions into days, is either to give the day of the Month sought for, or by the day of the Month given, to find another thing required, as the question imports.

3. The use of the stars and their Constellations is twofold: 1. To learn to know those stars one from another, and from all other stars. And 2. Knowing them, to make use of them, as the question ye are to resolve requires.

And note this, That that star which is in the Tayl of the *little Bear*, is nearest the North Pole, and as in the Rundle all the rest of the stars seem to move round this star, so do they in the Heavens seem to move round it also. This being an exact Type or Figure of the stars near the Pole.

4. The use of the Meridians which run through the Pole: (or rather meet together in the Pole) Their use is three-fold: 1. For the more ocular distinction of each Month. 2. To shew the Right Ascension of any star described in the Rundle. And 3. To shew how to bring any star to the Meridian of the Nocturnal, which is the hour of 12 under the *Flower de Luce*.

Also because we seldom see a star just upon the Meridian, therefore do these Meridians shew how to place the star either short or past the Meridian, which we could not do so well by guess.

Thus much I judged meet, not only for the use that these definitions are of in the use of the Instrument, but because they may satisfie the desire of some that are not versed in Mathematical Phrases, and yet would willingly know the reason of such things. Therefore to conclude this discourse with a few of the me

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practical uses of this Instrument, that may be easily understood of those that are not Mathematically disciplined.

First then, To learn to know the stars described in the Rundle one from another, and from the rest of the stars that we see in the Heaven.

In a night when the stars may be seen, look toward the North part of the Heaven, and there you may take notice of seven very bright stars, lying in the same form as ye see in the Image of the *great Bear*; four lying in a square, or like the four Wheels of a Waggon, and three, which you may imagine to be three Horses following one another; the form how they lie, you may see in the Rundle between the letters A, S, O; these being well known, you may look what stars lie near any one of them, and there you will find what star it is. As for example.

I see a star lying just over the star in the *great Bears* back: looking in the Rundle I find that star to be in the end of the *Dragons-tayl*, and so you may learn to know them all one from the other, comparing the stars ye see in the Heaven to them that are in the Rundle; and though you may see many stars in the Heaven, yet these are of the greatest magnitude amongst them.

Another way to know the true name of a star, and to know it from others.

First note a star in the Heaven, that you see upon, or near the Meridian; then look in the Nocturnal for the day of the Month, and bring that day to the hour of the night next the *Flower de Luce*, then look what star lyeth between the *Flower de Luce* and the Pole in the Rundle, and that is the star, and its name which I see in the Heaven: but then if looking on the Rundle, I find two stars lying between the *Flower de Luce* and the Pole, then you must note which is nearest the Pole, and which furthest off, and so you may know each from other: And because to know the North-star is very expedient, I will shew you how to do it, after I have given an example of what I last laid down.

Upon the first of *April*, at half an hour past nine, I see two bright stars upon the Meridian, the one nearer me then the other; then to know the names of those two stars, and to know them from others, I bring the letter *A* for *April* to half an hour past nine from Noon, (the *Flower de Luce* noting Noon) and so counting 1, 2, 3, to half past nine, then looking in a right Line from the *Flower de Luce* to the Pole, I see the star nearest me as it lies in

a the Heaven, to be in the thigh of the great
re Bear; and that furthest from me, to be in the
e back of the Bear; and then looking a little to
e East in the Heavens, I see two more fol-
low in a Front, and after them cometh three
more: for these I look in the Rundle, and one
of the two next to the two I found on the Me-
ridian, is upon the great Bears buttock; the o-
ther in the root of his Tayl: The first of the
three following, I find to be thus: The first in
the Tayl, the second in the middle of the Tayl,
the third in the extreamity or end of the Tayl:
And by this you may come to know all the
stars inscribed in this Rundle. And this al-
waies note, That the star which in the Heaven
ye find next to you, that star will appear next
the edge of the Rundle; and this is when ye
find two stars upon the Meridian at once.

Now I shall shew you how to find out the
North-star, from the rest which you see in the
Heaven; and this star is very bright, being one
of the second magnitude or bigness.

The most exact and speedy way is this:

Take a Quadrant Astrolabe, or Cross-staff,
and as near as you can guess, look (through the
sights of your Instrument) into the North part
of the Heaven, so high as is the Latitude of
your place, and it will soon shew you where-
about

about it is, for there is no star so great near it; and when you have thus found it, be sure you note it well how it lies from other stars, that you may know it again: Thus at *London* the Latitude being 51 Degrees and an half, I lift up the Sights of the Quadrant or Astrolabe, til the thred of the Quadrant, or Aledida of the Astrolabe fall upon 51 Degrees and an half; then looking still at that height, I look as near the North point as I can guess, and there, or very near is the Pole or North-star. If you have a Magnetique Needle that will shew you the North point of Heaven.

The next way to find the North-star is this, which is done without any Instrument.

Look into the North part of Heaven, note some star that is little above half the height of Heaven, from the lower part of the Heaven; and by diligent notice, see whether in an hours time or more, you can see it remove from the place where you first saw it; if it be removed, that is not the star; and so continuing note the star that lyeth as before said, half above the Horizon, and moves not, and that is the Pole-star; and this star will be the sooner known, because it is more remote from any bright star, then any star near it.

The reason why this star moves not is, because

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cause it is near the Pole, and the other stars moves round this; yet is not this star without a motion, for it moves round the true Pole, but the eye can scarce perceive it to move at all.

An example of this in a night when the stars may be seen:

I look up half way into the Heaven, and a little higher, and as near North as I can; which I know by the building of a Church, whose Steeple stands alwaies West from the Church, and there I see a bright star by it self, and it stands so that I may just see it by the edge of a House-wall; then I mark how and where I stood, and go away, and come two, three, four, or five hours after, and stand just in the place as I did before, and find that the star is not removed out of that place; therefore by all tokens this must needs be the Pole-star: but if I find the star removed, I conclude that that is not the star, but I try another and another till I do find it; taking this for a sure ground, that it lyeth full North from me, and that a little above half of the height of the Heaven, or thereabout, in the Latitude of 51 Degrees.

The next thing is, How to know the Meridian in the Heavens.

Having found out the North-star, fix your eye upon it, and imagin as near as you can, a
di-

direct Line to be drawn from that star to the place in the Heaven right over your head, and that Line is the Meridian; and when you see any known star come to this Line, then is that star upon the Meridian; when a star is not quite come to it, that star is said to want of its coming to the Meridian; when a star is gone past this Line, 'tis past the Meridian; and this Line (for so I call it, because all men know not the meaning of an Arch) is an Arch of the true Meridian of the place; and whereas I say let this Line be drawn from the Pole-star, it is for the ease of those who are not versed in Astronomy; though the true Arch of the Meridian must be drawn from the true Pole, yet in the use of this Instrument it begets no sensible error to draw this Line or Arch from the Pole-star.

The next thing is to find the right Ascension of any star in the Rundle.

Suppose the outmost edge of any Rundle were divided into 360 parts or Degrees, then must you begin to number at the Meridian-Line that cometh from the Pole to the letter M, which shews *March*: and so count on, allowing to each space 30 Degrees, and that will give you the Right Ascension of the star you desire: As for example.

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I desire to know the Right Ascension of the bright star in the end of the great Bears Tayl : I begin at M for *March*, and proceeding I say, 30 and 30 and 30, is ninety: 30 30 30. is ninety more: 180 and 30, is 210, and about five Degrees more: so that I find the right Ascension of this star to be 215 Degrees.

The day of the Month, & a star on the Meridian, being given, to find the hour of the Night.

Bring the star which you see upon the Meridian to the *Flower de Luce*, and then look for the day of the Month, and right against it you have the hour of the Night given.

EXAMPLE,

Upon the first of *April* at night I see the bright star in the middle of the great Bears-Tayl upon the Meridian: therefore I bring it to the *Flower de Luce*, and looking upon the first day of *April* I find it is $\frac{1}{4}$ of an hour past 11.

Next, The hour of the Night, with a star upon the Meridian given, to find the day of the Month.

Bring the star to the *Flower de Luce*, and right against the hour of the Night, is the day of the Month.

This question may truly be performed, if your Nocturnal be true; and you know the time of Night to three or four Minutes, other-

therwise you will work false.

Lastly, the day of the Month, with the hour to know what star is upon the Meridian.

Bring the time of the day, and the day of the moneth together, and what Star you find upon the line that goes through the middle of the Flower de Luce and the Pole, those are upon the Meridian. And note this, that you are to count your time from the Flower de Luce, 1, 2, 3, 4, and so on to 12 at night, till you come to 12 at noon, where you began; so that the Flower de Luce notes the hour of 12 at Noon, and the rest on in order from Noon to Midnight, and so to Noon again.

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